

WHAT IS CLAIMED IS:

1. A martensitic stainless steel comprises less than 0.06 wt.% C, less than 2.5 wt.% Si, less than 2.5 wt.% Mn, 1.0-6.0 wt.% Ni, 10.0-19.0 wt.% Cr, 0.5-6.0 wt.% W, less than 3.5 wt.% Mo, less than 0.5 wt.% Nb, less than 0.5 wt.% V, less than 3.0 wt.% Cu, 0.05-0.25 wt.% N, and the remainder being Fe and minor impurities.
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SD
D1
2. A martensitic stainless steel of claim 1 further comprising at least one of less than 0.8 wt.% Ti and/or 1.0 wt.% Ta.
3. A martensitic stainless steel comprises less than 0.035 wt.% C, less than 2.0 wt.% Si, less than 2.0 wt.% Mn, 1.5-4.5 wt.% Ni, 12.0-16.0 wt.% Cr, 0.5-4.5 wt.% W, less than 2.5 wt.% Mo, less than 0.3 wt.% Nb, less than 0.3 wt.% V, less than 2.0 wt.% Cu, 0.08-0.20 wt.% N, and the remainder being Fe and minor impurities.
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SD
D2
4. A martensitic stainless steel of claim 3 further comprising at least one of less than 0.8 wt.% Ti and/or 1.0 wt.% Ta.
5. A method for manufacturing a martensitic stainless steel comprising the steps of:
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SD
D3
- casting a stainless steel comprises less than 0.06 wt.% C, less than 2.5 wt.% Si, less than 2.5 wt.% Mn, 1.0-6.0 wt.% Ni, 10.0-19.0 wt.% Cr, 0.5-6.0 wt.% W, less than 3.5 wt.% Mo, less than 0.5 wt.% Nb, less than 0.5 wt.% V, less than 3.0 wt.% Cu, 0.05-0.25 wt.% N, and remainder being Fe and minor impurities; and
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SD
D4
- submitting the cast stainless steel to an austenization heat treatment

at a temperature of 800-1150°C and/or tempering the stainless steel
at a temperature of 350-575 °C.

6. A method of claim 5 wherein the stainless steel further comprises at least one of less than 0.8 wt.% Ti and/or 1.0 wt.% Ta.

- 5 7. A method for manufacturing a martensitic stainless steel comprising the steps of:

casting a stainless steel comprises less than 0.06 wt.% C, less than 2.5 wt.% Si, less than 2.5 wt.% Mn, 1.0-6.0 wt.% Ni, 10.0-19.0 wt.% Cr, 0.5-6.0 wt.% W, less than 3.5 wt.% Mo, less than 0.5 wt.% Nb, less than 0.5 wt.% V, less than 3.0 wt.% Cu, 0.05-0.25 wt.% N, and remainder being Fe and minor impurities;

mechanically-processing the stainless steel such that work hardening is generated in the stainless steel; and submitting the mechanical-processed stainless steel to an austenization heat treatment at a temperature of 800-1150 °C and/or tempering the stainless steel at a temperature of 350-575 °C.

8. A method of claim 7 wherein the stainless steel further comprises at least one of less than 0.8 wt.% Ti and/or 1.0 wt.% Ta.